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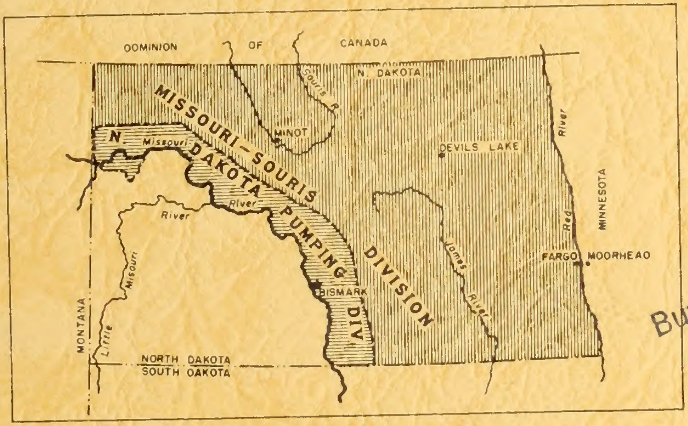
ANNING AND CLASSIFICATION REPORT

AS RELATED TO THE PUBLIC DOMAIN LANDS

IN THE

MISSOURI-SOURIS DIVISION
AND
N. DAKOTA PUMPING DIV.



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NORTH DAKOTA

A MISSOURI RIVER BASIN INVESTIGATION

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
REGION III
BILLINGS, MONTANA

AUGUST 1951

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Land Planning and Classification Report of the public domain lands in the

MISSOURI-SOURIS DIVISION

and

NORTH DAKOTA PUMPING DIVISION

in North Dakota

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A Missouri River Basin Investigation

For Administrative Use Only

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
REGION III
BILLINGS, MONTANA

August, 1951

This study is a feature of the program
of the Department of the Interior for the development
of the resources of the Missouri River Basin

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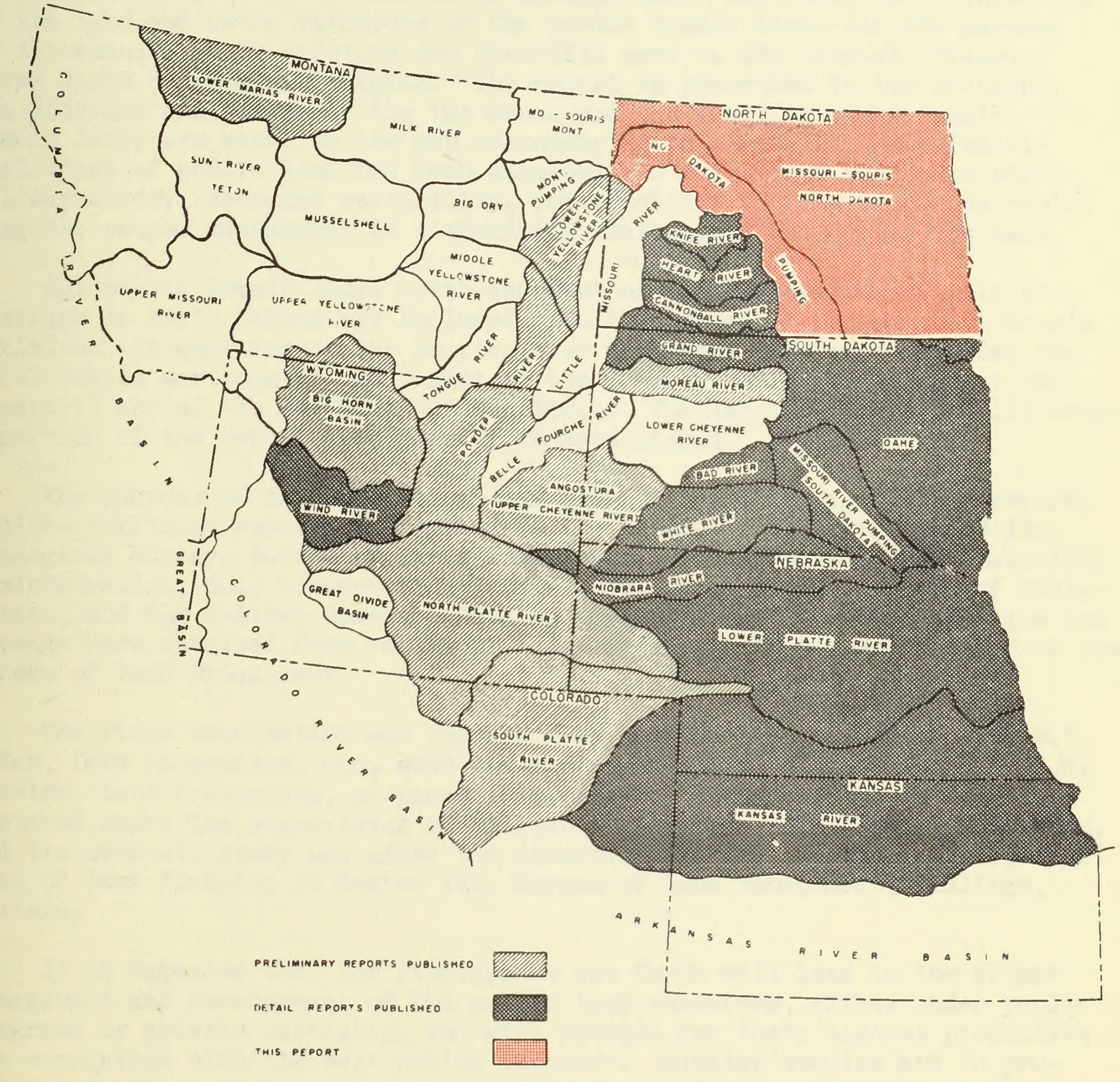
PRESENT STATUS OF BUREAU OF LAND MANAGEMENT STUDIES IN THE MISSOURI RIVER BASIN (LAND CLASSIFICATION)



PREFACE

This report is concerned with the public domain lands within the areas of influence of the Missouri-Souris Division in North Dakota and of the North Dakota Pumping Division. These are two divisions of the Missouri River Basin Project of the Bureau of Reclamation. The study is an inventory of the land and water resources of the public domain lands for the purpose of determining their existing and potential uses in the over-all Missouri River Basin development program. The report is presented in two sections. The location and extent of the two areas and the location of the public domain lands are shown on the map accompanying this report. Each individual tract of public land has been examined and classified as to its physical capability, economic suitability, and condition as a basis for determining the proper management or disposition that should be made of the land.

All public domain lands north and east of the Missouri River main stem drainage in North Dakota are included with the report of the Missouri-Souris Division. In addition to the Souris River drainage, this area includes the North Dakota portions of the basins of the James River (a tributary of the Missouri) and of the Red River of the North. The Garrison Division will cover a portion of the report area when it is established.

The sources of the statistical and general information in these reports include published reports and data from the Bureau of Chemistry and Soils, Geological Survey, Bureau of Agricultural Economics, Production and Marketing Administration, Soil Conservation Service, Bureau of Census, Bureau of Reclamation, and the Weather Bureau. Data on land ownership, leases, location and acreage were obtained from county offices, local residents, and records of the Bureau of Land Management.

The field examination and surveys were made by Ward L. Hopper, and M.T. Solan, Land Economists, who, with the assistance of J. Elliott Hall and C.R. Peteler, Land Economists, prepared this report. The accompanying map was prepared under the supervision of William C. Anderson, Engineering Draftsman, and the over-all study was under the direction of R. D. Nielson, Chief, Division of Land Planning in Region III, Bureau of Land Management, Billings, Montana.

It is intended that the findings as set forth will lead to the proper management and development of the public land resources, either under public programs or private ownership, and will provide for their highest productive use consistent with the best public interest. Similar studies are in progress and others have been completed for other tributary drainages in the Missouri River System. Areas with field investigations under way, and those for which reports have been completed are shown on the map at the beginning of this report.

GENERAL DESCRIPTION

Location and Size

The Missouri-Souris Division area comprises in general the eastern and northern portions of North Dakota. Its western boundary is located on the divide between the drainage basins of the Missouri, James, and Souris Rivers. This is a line extending through or close to the towns of Ashley, Napoleon, Steele, McClusky, Benedict, Stanley, Powers Lake, Battleview, Wildrose, and Grenora. The boundaries of North Dakota form the northern, eastern, and part of the southern and western boundaries of the area. The area includes the drainage basins of the Souris, James, and Red Rivers in North Dakota, the James River being the only tributary of the Missouri River. The approximate size of the area is 26,800,000 acres, or 41,875 square miles. The map of North Dakota accompanying this report shows the unit area and the public domain lands therein.

Geology and Physiography

The area embraces three physiographic regions--the Red River Valley, Drift Prairie, and the Missouri Plateau. The Red River Valley occupies an ancient lake plain and has a breadth of 35 to 40 miles, narrowing to 10 miles at the southern end. No bedrock is exposed in the area and the surface is deeply covered with silt, overlying a thick layer of glacial drift. The surface is level and the runoff of rainwater is slow.

The Drift Prairie is gently rolling to hilly. It is largely glaciated, and the numerous promiscuously scattered small lakes, depressions, and potholes are an outstanding feature of the physiography. Most of the lakes are alkali, intermittent and shallow. Many dry up in the late summer and others during the drought periods. Devils Lake is the largest lake in the area and comprises about two townships or approximately 50,000 acres. As a result of glaciation, much of the land surface is stony, and cultivation is precluded by the rocks and hilly relief in portions of the area. The valleys of the James and Sheyenne Rivers are broad and level for the most part, whereas that of the Souris in parts of its course is narrow with rough, steep slopes. The upper valley of the Pembina River is bordered by rough and eroded breaks which are spectacular and scenic. The adjacent hilly areas are called the Pembina Mountains.

The Turtle Mountains, situated in the northeastern part of Bottineau County and the northern part of Rolette County, are a conspicuous physiographic unit. As a result of unequal erosion, these mountains, which should be more properly considered hills, have been left standing from 400 to 600 feet above the surrounding plain. The general elevation ranges from 2,000 to 2,100 feet above sea level, with two of the higher elevations, Bear Butte and Butte St. Paul, being 2,200 and 2,300 feet respectively. The surface, for the most part, is rolling to hilly, a large part of the area being cultivated. There are numerous depressions and lakes; the water is fresh for the most part. Several of the larger lakes have been developed as summer resorts.

The Missouri Plateau occupies the western and northwestern portions of the area, bordering on the western edge of the glacial drift. In general, it is 500 to 600 feet above the drift area and has a level to gently rolling surface. The major part of this region is glaciated, and rocky moraines, hilly areas, and glacial lakes and depressions are common.

The general elevation of the area ascends from about 800 feet above sea level along the eastern boundary to approximately 2,200 feet in the northwestern portion. Elevations on the eastern boundary are represented by that at Pembina, 789 feet, and Grand Forks, 830 feet; while the northwestern portion is represented by those at Powers Lake and Crosby, 2,205 feet and 1,954 feet respectively.

Minerals

A large portion of the area in its western section is underlain by lignite coal. It has been estimated that more than 600 billion tons, or enough for the nation's needs for 400 years, underly about 28,000 square miles in western North Dakota. The coal furnishes the principal fuel supply for local needs and it is briquetted into high class fuel at a Minot plant. Gasoline, plastics, various oils, acids, dyes, and paints can be made from lignite where it can be economically mined. It is utilized in thermal plants for electric power production. Lignite and its development offers possibilities for new industries in the area.

The Miller, Grenora, and other lakes in the northwestern part of the area offer possibilities for development of a sodium sulfate industry. A number of these lakes are included in sodium leases, and development of one lake has been initiated. Large quantities of sodium sulfate are used in the production of paper, glass, stock feeds, soap, freezing mixtures, and other products. High freight rates, low prices, and supply sources closer to markets have prevented extensive mining of sodium sulfate in this area. Some activity in exploring for gas and oil is occurring in the area at present. The discovery well in the Williston Basin makes it possible for much of the area to be potential oil and gas lands.

CLIMATE

The climate ranges from sub-humid in the eastern part of the area to semi-arid in the western part, particularly the northwestern section. The average annual precipitation at Fargo, located in the extreme eastern portion of the area, is 23.34 inches; while at Crosby, in the northwestern part, precipitation is 14.53 inches. Droughts occur in the eastern section but they are relatively infrequent and not extremely severe with respect to crop damage. In the western and northwestern sections, it is necessary to practice dry farming and summer fallow methods in order to insure successful crop yields. At Crosby, during a period of 38 years, there were 12 years in which the annual precipitation was less than 12 inches and 23 in which it was less than 16 inches. At Fargo over a period of 64 years, there were only 3 years in which the annual precipitation was less than 12 inches and 8 years in which it was less than 16. Features of the climate of the area are presented in table 1.

The area is characterized by wide extremes in temperature from summer to winter ranging from 50° below zero Fahrenheit to 112° Fahrenheit. The growing season is of sufficient length to produce cereals, alfalfa, potatoes, sugar beets, most garden vegetables and some small fruits. During the winter, shelter and supplemental feeding are generally required for livestock. Heavy snowstorms, blizzards, and prolonged cold spells during severe winters have resulted in considerable loss of livestock. Snow persists all winter in the northeastern portion of the area. Floods, generally the result of ice jams in the larger streams, have caused considerable loss in livestock and damage to property. Hailstorms are quite frequent in the summer, especially in the western part of the area, resulting in some loss of crops, but damage usually occurs in small restricted areas. Strong winds are common, but tornadoes are infrequent.

SOILS

The parent soil material of the major portion of the area is glacial drift. These soils are generally of the loam types, ranging from sandy loams to clay loams, a large proportion being dark in color. Because of glacial action, gravel and stones occur frequently. In the glacial moraines and sharply rolling sections they are so abundant as to preclude successful cultivation. For the most part, the soil depth and plant food elements are adequate to produce good crops. The soils are generally low in organic matter and high in lime content. The soils of the Red River Valley comprise silt loams, sandy loams, and clay loams. They are free of stone and rock and are exceedingly fertile. The area is noted as an outstanding agricultural district.

The soils of the valley bottoms of the larger streams are alluvial in character for the most part and are generally fertile. The shores of the alkali lakes in many cases have a clay alkali and hardpan soil of no farming value. There are a number of comparatively small areas of dune sand, the largest of which is in McHenry and Pierce Counties. These areas are unsuitable for farming, but produce fair pasturage for livestock with occasional patches of lowland which is capable of producing hay. Many of the upland soils in the glaciated portion have high concentration of sodium salts which tend to reduce their permeability and consequently impair their value for irrigation.

VEGETATION

Three general grassland types cover the area: an eastern type, a central transition type, and a western type. The eastern type is confined largely to the Red River Valley, and includes tall and mid grasses, the principal species being big bluestem, porcupinegrass, sideoats grama, feather grass, slender and bluestem wheatgrass, prairie junegrass, and Kentucky bluegrass. The central grassland type occupies an area between the western boundary of the Red River Valley and the edge of the Missouri Plateau. This type includes both tall, medium, and short grasses, the short grasses being dominant in the western part. The chief species include needleandthread, blue grama, prairie junegrass, and Kentucky bluegrass. The western grassland type embraces chiefly the northwestern part of the area, and the semi-arid sections. The dominant species in this type are blue grama, bluestem wheatgrass, needleandthread, junegrass, threadleafsedge, little bluestem, and Sandberg bluegrass. The depressions, potholes, and intermittent lakes which are relatively free of alkali support prairie cordgrass, American sloughgrass, prairie sandreedgrass, and sedges. In alkali areas adjoining alkali lakes, inland saltgrass, bluestem wheatgrass, green needlegrass, switchgrass, and Nuttall alkaligrass are the principal species.

Sandhill areas, the largest of which are located in McHenry and Pierce Counties, are covered with prairie sandreedgrass, sand bluestem, needleandthread, big and little bluestem and Canada wildrye. Brush types, including snowberry, silver buffaloberry, and Fendler woods rose are common in those areas with patches or groves of bur oak, eastern poplar, quaking aspen, green ash, American elm and chokecherry trees. Similar brush types are prevelant in the Turtle Mountains with a large proportion of the area supporting trees such as quaking aspen, paper birch, bur oak, green ash, American elm and eastern poplar. The rough breaks of the Souris River and other streams support brush types including snowberry, Fendler woods rose, silver buffaloberry, and groves of trees including chokecherry, wild plum, eastern poplar, green ash, and American elm.

Vegetative densities in the area range from 3/10 to 6/10 of the total ground cover. The grazing capacity ranges from 1 to 5 surface acres per animal unit month.

SETTLEMENT HISTORY AND POPULATION

The first settlement of the area began about 84 years ago after its first exploration by General Sully in 1864. After the extension of the Northern Pacific Railroad through the area in the early 1880's, many large cattle ranches were established, the stock utilizing the open public range. The greater part of the open range was acquired by settlers under the homestead laws during the period 1890 to 1910, and cultivated to cash grain crops. Wheat raising was expanded by the demand for food and high prices during the period of 1914-1920, but the droughts of 1931-1936 resulted in the abandonment of the marginal farming lands. The small farms of 160 to 320 acres could not provide an adequate living, and agricultural operations have developed into a combination of grain and livestock enterprise with the average size of the farm increasing to 670 acres.

The area includes the most heavily populated regions in North Dakota, particularly the Red River Valley. Fargo, with a population of 32,580 in 1940 increased to 37,981 in 1950; Grand Forks with a population of 20,228 in 1940 increased to 26,617 as of April 1, 1950. These two of the larger cities in the state are in this area. Other cities in the area are Minot with a population of 21,924, Jamestown, 10,601; Valley City, 6,823; Devil's Lake, 6,419. The total population is 456,000, or about 10 persons per square mile. About 80% of the population is urban and census data shows that the percentage of urban population has been increasing. The average size of the farms has also increased, due largely to the use of power machinery and fallow practices in the semi-arid sections.

PUBLIC FACILITIES

The area is served by three railroads--the Northern Pacific, Great Northern, and the Minneapolis, St. Paul and Sault Ste. Marie. The last two railroads connect with the Canadian Railroads. A network of branch lines from these railroads extends into all interior parts of the area. United States Highways No. 2 and 10, which are paved, extend east and west through the area. The principal paved United States Highways traversing the area north and south are Nos. 81, 83, 85, and 281. A network of graveled and improved State highways and county roads connects all the towns and cities with farms and ranches. The towns and villages and many of the farms and ranches are connected by telephone and rural electrification lines. Additional power lines are being planned for areas not yet served.

High schools are located in all the cities and towns, and grade school facilities are available to all rural areas. Some rural schools are being consolidated into one large central school with bus lines for transportation. Colleges are located at Bottineau, Fargo, Grand Forks, Jamestown, Mayville, Minot, Valley City, and Wahpeton.

TRADE AND INDUSTRY

The area economy is based primarily on the production of farm crops and livestock. Farms with livestock, grain, hay, and pasture are typical. North Dakota produces about 45% of the country's spring wheat and over

75% of the durum wheat grown in the United States. It also leads all states in the production of barley, producing about 20% of the nation's crop. North Dakota has a larger acreage of certified seed potatoes than any other state and the production of seed for southern states and Caribbean countries is an industry with an annual income of twenty million dollars. Other important crops are flax, hay, corn, sugar beets, alfalfa, oats, and soy beans.

Rough lands along the Missouri divide in the western portion of the area are used for grazing beef cattle. Exclusive wheat farms are largely west of Minot. Strip farming and summer fallowing are general practices west of the Souris River. Eastward annual cropping is the general practice. Small grain following corn is a common practice, the corn being used as a weed control crop in lieu of summer fallow. More intensive farming is practiced in the northern and eastern portions of the area, with dairy cattle, poultry, and hogs. Wild hay is a common type of land use over much of the area for lands that are not suited for farming because of topography, sandy soil, or poor drainage.

Red River Valley in North Dakota is a 25-mile wide strip along the eastern boundary of the area. This old lake bed is fabulously fertile and is used for general farms, largely of the livestock grain type. Sugar beets are produced for the factory at Moorhead, Minnesota. Potatoes and alfalfa are important crops in the valley. Soils and climatic conditions are favorable for the continued production of cultivated crops in the Red River Valley and in the eastern part of the area. Semi-arid conditions, cyclical and irregular droughts, as well as marginal rainfall in the western part make farming hazardous.

The importance of farming and livestock production in the economy of the area is shown by the following 1945 statistics of the Bureau of the Census for North Dakota:

Value of farms (lands and buildings)	$708,322,155.00
All farm products sold or used by farm households	391,348,810.00
Total value of livestock and livestock products sold	112,149,540.00
Total value of livestock	161,367,761.00

The area offers a strong potential for the defense effort. The large lignite deposits are of immense value for liquid fuel conversion, thermal power, and chemurgy. The probable oil and gas deposits, and the development of low cost power at Garrison Dam are other important resources. Garrison Dam will have an initial power capacity of 240,000 kilowatts and an ultimate capacity of 400,000 kilowatts. Straw available from the grain crops and other crop by-products and residues could be utilized for paper or strawboard. Aluminum reduction, hide tanning, and wool scouring are possible industrial developments. The production of oil seed crops in addition to flax, and crops for fiber or new special uses, are possibilities of the area. Reclamation development of irrigated areas will help to stabilize the livestock industry and will greatly increase the agricultural potential. While the labor supply is limited, it is of a high type. Development of these resources of the area will attract many industries. Low cost power and irrigation will intensify agriculture in the area. Dairying, poultry, and other intensive enterprises will probably increase in number and volume with low cost power and with rural, urban and industrial development. The majority of the present rural residents are of Nordic stock with tendencies to develop these enterprises under favorable conditions. Transportation in the area is favorable to industrial and agricultural development. The Great Northern Railroad traverses the state from Grand Forks westward through Buford. There are several branch lines extending from this main line servicing the northern ties of cities and also some of the southeastern cities. Transportation from east to west across the southern half of the state is adequately furnished by the Northern Pacific main line which extends from Fargo on the east through Jamestown and Driscoll westward. North-south transportation is provided by branch lines of these two transcontinental railroads and by the Minneapolis St. Paul and Sault Ste. Marie Railroad.

LAND DEVELOPMENT PROGRAMS

Development plans of the Bureau of Reclamation as presented in Senate Document No. 191 for this area contemplated the irrigation of about 1,000,000 acres in the Crosby-Mohall region, and 108,500 acres in the James River Basin. Investigation of the area has disclosed conditions which may induce considerable change in these plans. In addition to irrigation, benefits include restoration of Devil's Lake and Stump Lake, including their regulation for wildlife, conservation, and recreational purposes. The project will supply water for municipal and sanitary purposes for 19 cities and towns in the Dakotas and Minnesota. It supplements Red River flows to the extent necessary for pollution abatement, and augments James River flows as surpluses are returned to the Missouri River. All development programs are in the planning, investigational stage and are tentative so areas and sites are subject to change.

The Garrison Diversion Project proposes to irrigate about 1,000,000 acres in the Minot, Carrington, Fessenden, Jamestown, Edgely, and the Steele-Bismarck areas. The water supply will be diverted from the Garrison Reservoir and carried to the land by a series of relifts through pumping plants. Garrison Dam is being constructed under contract by the Corps of Engineers. It is located in the Missouri River in the west central portion of the state, 75 miles upstream from Bismarck Garrison Dam is a multipurpose project for flood control, hydroelectric power, irrigation, navigation, water supply, and sanitation. The reservoir will extend upstream about 200 miles to the Montana state line. It will have a capacity of 23,000,000 acre-feet and a surface area of 390,000 acres at the maximum normal operating pool level. The dam and lake are located in the North Dakota Pumping area. Low cost power from Garrison Dam, which will have an ultimate capacity of 400,000 kilowatts, will be available to the Missouri Souris area. Power required to pump water over the divide on the Missouri Souris Division near Grenora will be provided by power plants utilizing water power to be developed near Crosby and Kenmare.

Baldhill Dam and Reservoir is located in east central North Dakota on the Sheyenne River about 16 miles north of Valley City. This earth filled dam was constructed for flood control and water utilization by the Corps of Engineers. Baldhill Dam provides substantial protection from the maximum flood of record in the reach from the dam to the edge of the Red River flood plain and will, to some extent, reduce flood damages downstream from that point. It will also provide sufficient flow during low water periods to meet water supply and pollution abatement requirements of municipalities and rural areas along Sheyenne River and Red River below the mouth of the Sheyenne and at Fargo-Moorhead by means of a diversion ditch to be constructed by local interests. This project, though not entirely completed at the time, was placed into emergency operation during the spring of 1950 because of severe flood conditions. It is estimated that over a million dollars worth of damages was prevented as a result of putting this project into operation for this one flood.

Jamestown Dam and Reservoir, to be located one mile north of Jamestown, is being planned as a multipurpose structure. It will have a total capacity of 230,000 acre-feet, 200,000 of which will be flood storage, 20,000 conservation storage and 10,000 silt storage. Sheyenne Dam and Reservoir, near Sheyenne, will augment the benefits provided by Baldhill Dam. This proposed reservoir will have 635,000 acre-feet capacity. The Crosby Reservoir is to store 230,900 acre-feet of irrigation water.

LAND OWNERSHIP AND MANAGEMENT PROBLEMS

About 90% of the land in the Missouri-Souris Division area is privately owned. The remaining land is owned by Federal and State agencies or by counties. The unreserved public domain lands in the area comprise 21,968 acres. The area includes three Indian Reservations--Fort Totlen, Turtle Mountain, and Sisseton. Only a small portion of Sisseton is located within the area, the major part being located in South Dakota. The land under the jurisdiction of the Bureau of Indian Affairs in these three Indian reservations comprises 131,518 acres.

There are two land utilization projects in the area, situated in Ransom and Richland Counties. They include lands repurchased by the Federal

Government under the provisions of the Bankhead-Jones Act. These projects are administered by the Soil Conservation Service. The repurchased lands are subject to exchange where such action will facilitate the management of the project. The lands are suitable chiefly for grazing and are leased under agreements to local stockmen. One tract of public domain land consisting of 40 acres is located within one project. The total area in the projects is 69,701 acres.

Two areas have been set aside as proposed National Forests. One of these areas is called the Souris Purchase Unit and is located in Bottineau, McHenry, and Pierce Counties. This purchase unit contains 471,908 acres, including approximately 2,450 acres of public domain lands. The other area is located in Cass, Ransom, and Richland Counties and is called the Sheyenne Purchase Unit. It contains 292,517 acres, but there are no public domain lands within this unit. The public domain lands in the Souris Purchase Unit were withdrawn by Executive Order 5258 on January 9, 1930. These public domain lands are administered by the Bureau of Land Management. When these two units were set up, the Forest Service was to purchase lands within this area through monies appropriated to the Forest Service by the Congress. A total of 520 acres of land has been purchased in the Souris Unit to date. However, due to reduction in the amount of appropriations for land acquisition after these areas were approved, further purchases were not made. A development program is not anticipated for these areas in the immediate future. Since there are no long-range development plans for these areas by the Forest Service, a request should be made to have the Order withdrawing these lands revoked in order to permit proper disposition of these lands.

The area is covered by Soil Conservation Districts with the exception of Baines, Stutsman, McIntosh and Logan Counties, and portions of Richland County. The Soil Conservation Service cooperates with the farmers in carrying out a planned system of soil and water conservation in the districts.

There are 50 National wildlife refuges in the area, comprising 221,240 acres. Of this total, 153,600 acres are owned by the Federal Government and the remainder or 67,640 acres are private lands that are managed by the U.S. Fish and Wildlife Service through easement granted by the owners. The Upper and Lower Souris, Des Lacs, Lost Wood, and Arrow Wood are the largest refuges in the area, comprising 75% of the total area in refuges. One of the refuges, Sully's Hill Game Refuge, is primarily for the protection of buffalo, elk, and deer and the remainder are for waterfowl and upland birds chiefly. There are several State game refuges in the area administered cooperatively by the State Game and Fish Department and the U.S. Fish and Wildlife Service. Deer, pheasants, and grouse are important wildlife resources. Their habitat is largely within the timbered areas in the bottom lands, in the draws, and on the hills throughout the state. Public domain lands lack timber cover and are in such small tracts that they have virtually no value for deer. They do have considerable value for pheasants, other upland game birds, and for waterfowl.

THE UNRESERVED PUBLIC DOMAIN LANDS

The public domain lands consist of 352 separate tracts widely distributed throughout the area. The tracts range in size from .07 of an acre to 639 acres with a total area of 21,968 acres. Field examinations of the tracts were made in 1948 and 1950 and detailed information relating to such features as soil, vegetation, topography, extent of erosion, present and potential land uses, crops, grazing, timber, and minerals has been submitted in the form of classification reports for each piece. The reports, which are on file in the office of Region III of the Bureau of Land Management, also include an appraisal of the land and recommendations as to its proper management and disposition. Location, summarized description, classification, proposed management and appraisal of all public domain lands in the Missouri-Souris area by counties are shown in table 2. Details of the land-use capability classification utilized are given in table 3. The public domain lands have been classified into five land-use suitability categories: wildlife, conservation, grazing, mineral utilization, flood control, and farming. In the Missouri-Souris area, 15,310 acres have been classified from the standpoint of suitability as chiefly valuable for wildlife conservation, 4,613 acres for grazing, 1,186 acres for sodium mining, 509 acres for flood control, and 350 acres have been found suitable for farming.

Some of the tracts fall within the exterior boundaries of areas proposed for irrigation under the development project. However, none of these lands in such areas are suitable for irrigation because of rough topography, rocky soil, or location in an alkali lake. None of the lands are within proposed reservoirs or are traversed by canals or works contemplated for construction under the reclamation plans. The policy in reference to the disposal of isolated tracts of public land which are not needed or which cannot be effectively administered in connection with the Bureau of Land Management program is as follows: Other Federal bureaus, state and municipal governments are given first consideration in the order listed, providing the land is suitable for use and management by the respective public agencies. The public interest must be benefited by such use and management, and the use of these lands must be consistent with conservation principles. After the public interests are considered, the lands remaining are offered into public sale.

For the purpose of setting forth a program and appropriate recommendations for their proper management and disposition, public domain lands are grouped in three categories as described below.

A. Public lands primarily valuable or suitable for wildlife, conservation and recreation.

The major portion of these lands lies within or adjoining alkali or fresh water lakes. Many of these lakes dry up partially or entirely during drought periods or in the late summer or fall. When dry, the lake bed generally has no value for farming or grazing because of its barren alkali surface. Some tracts are entirely within a lake, but others include small areas of the lake shore, such as spurs or points extending out into the lake. The land area generally supports only a sparse growth of alkali sacaton, inland saltgrass, switchgrass, and green needlegrass with low grazing value. They usually provide a protection area and nesting place for waterfowl and upland birds. The water surface provides a habitat for waterfowl and in some cases, muskrats and beaver. In some cases, the lake may provide recreational facilities to a limited extent. These lands will be referred to the U.S. Fish and Wildlife Service and to the North Dakota Game and Fish Department for management under their wildlife conservation programs. In the event the lands are not desired or needed by those agencies, they will be disposed of by public sale. The total area of land in this category is 15,310 acres in 217 tracts.

B. Public lands that cannot be effectively or economically administered by the Federal or State government, and where the public interest will not be adversely affected by their disposition.

These lands are tracts that are chiefly valuable for grazing with a small portion of the acreage suitable for dry farming. The tracts are isolated and completely surrounded by privately-owned land for the most part. In a few cases, they adjoin county or state land on one side. They are not economic units in themselves, and they can be profitably used only with adjoining lands. In a number of cases, small portions of the tracts are cultivated in connection with adjoining lands. The cultivated area is too small in all cases to properly permit entry of the land under the homestead laws. This cultivation is in trespass and should be settled before the tracts are sold. Some of the lands are included in grazing leases at present, but there appears to be no reason for retention of the land in Federal ownership. The lands are generally in good condition and they do not contribute to any public problem. The public interest would be best served by disposal of the lands under the public sale laws. The lands in this type of proposed management total 4,963 acres in 96 parcels. In this area there is a total of 4,613 acres suitable for grazing and 350 acres suited to farming.

C. Public lands primarily valuable for mineral development.

These tracts are included in lakes situated in the northwestern part of the area. They contain deposits of sodium sulfate and are included in sodium leases issued by the Federal Government. The tracts have limited grazing value, but no value for farming, wildlife conservation, or other uses. It is recommended, therefore, that they be retained in Federal ownership. The tracts in this category total 1,186 acres and comprise 9 tracts. Much of the public domain land in the northwestern part of the area is underlain with lignite coal. It is also possible that an undetermined portion of the public domain may be potential oil or gas lands.

D. Public lands to be utilized for flood control.

Fourteen tracts of land totaling 509 acres will be utilized in the development of reservoirs in the area. These lands will be used in flood control and will also be of value for wildlife conservation, recreation, navigation, and in furnishing low cost hydroelectric power. The new uses of this land will aid in developing the economy of the state of North Dakota.

E. Classification of public land.

The 21,968 acres of public land within the area lie in 352 separate parcels. Classification of the public domain lands within the Missouri-Souris Division area according to their land-use capability, condition, and suitability are shown in table 2. Description and definitions of land-use capability classes are given in table 3. The location of the public domain lands is shown in the map of North Dakota accompanying this report. Proposed management of public domain lands in the Missouri-Souris Division area is summarized as follows:

Type of Land Use	Area in Acres	Percent of Total Public Domain
Wildlife conservation	15,310	70
Grazing	4,613	21
Mineral utilization	1,186	5
Flood control	509	2
Farming	350	2

NORTH DAKOTA PUMPING DIVISION AREA

GENERAL DESCRIPTION

The North Dakota Pumping Division area is a strip of land about 40 miles in width, adjoining the Missouri River throughout its entire length in North Dakota. The western boundary of the area is near the Missouri River and the eastern and northern boundary is the divide between the Missouri River and the James and Souris Rivers. In addition, an area south of the Missouri River, averaging about 15 miles in width and roughly 60 miles in length, between the Montana-North Dakota state line and the town of Sanish, has also been included. The northern boundary of this area is the Missouri River and the southern boundary is the divide between the drainage areas of the Missouri River and the Little Missouri River. The North Dakota Pumping Division area comprises substantially all of Emmons, Burleigh, McLean and Williams Counties and portions of McIntosh, Logan, Kidder, Sheridan, Ward, Mountrail, and McKenzie Counties, as shown on the map accompanying this report. The entire area contains approximately 11,000 square miles or about 7,040,000 acres.

This area has been delineated for study to include all of the public domain lands which are likely to be affected by the development of the proposed units of the North Dakota Pumping Division by the Bureau of Reclamation. Areas influenced by the construction of the Garrison and Oahe Dams by the Corps of Engineers and some of the proposed irrigation developments from the Garrison Reservoir are also included.

GEOLOGY AND PHYSIOGRAPHY

The area is characterized by three general types of topography: the level to rolling tablelands of the Northern Great Plains, the rough, steep breaks of the Missouri River and its tributaries, and the level bottom lands and valley terraces of the Missouri River flood plain.

The table or plains lands comprise the major part of the area and occupy benches from 50 to several hundred feet above the Missouri River. The land surface is generally level to gently rolling, but a considerable part of these lands have a sharply rolling to hilly relief. Substantially all of the lands have been affected by glacial action, which is evidenced by the presence of glaciated boulders. In some local areas, cultivation is precluded by the excessive amounts of rocks and boulders. The area is characterized by numerous glacial depressions and lakes, many of which contain high concentrations of salts or alkali. The majority of these lakes contain water only during the spring and early summer, while in periods of droughts they are entirely dry. A few, however, contain permanent supplies of fresh water, and some are included in National wildlife refuges.

The breaks of the Missouri River and its tributaries range in width from less than 1 mile to as much as 10 miles. The largest areas of this type are located in Williams, Mountrail and McKenzie Counties, where they extend from 6 to 10 miles from the river valley. These lands are characterized by steep, rough and rocky slopes, often eroded into barren clay banks and buttes.

The level bottom lands and terraces of the Missouri River range in width from less than a half mile to four miles. The river is continually changing its course, and while some lands are being gradually washed into the river, there is a steady formation of new lands by the deposits of sand and silt. Comparatively large areas of land which were in the river channel 10 to 20 years ago are now producing good crops of alfalfa and grain.

The elevation of the water surface of the Missouri River is about 1,600 feet above sea level at the North Dakota-South Dakota state line and 1,900 feet at the Montana-North Dakota state line. The elevation of the plains area ranges from 1,711 feet above sea level at Linton in the southern part to 2,224 feet at Epping, in the northwestern portion of the area.

The parent geologic formations for the major part of the area are glacial drift and till, characterized by the abundance of gravel, rock, and boulders. In the breaks of the Missouri River, erosion has exposed the shales and sandstones of the Fort Union, Pierre, Hell Creek and Fox Hills formations. Much of the area is underlain with extensive deposits of lignite coal. Recent exploration for oil has disclosed the existence of oil and gas in the Williston Basin. Much of the area may be potential oil and gas land. Some bentonite is found in the area.

CLIMATE

The area lies in the semi-arid region of the western part of the United States, and is characterized by light rainfall and extremes in precipitation and temperature as shownin table 4. The annual precipitation has ranged from a low of 4.86 inches to a high of 30.92 inches. There is also a considerable range in the seasonal distribution of the rainfall, and occasional crop failures are due to the lack of moisture at critical periods during the growing season. The average rainfall ranges from 14.80 inches at Ashley in the southeastern part of the area, with an average of 16.49 inches for the entire area. The temperature has ranged from 53° below zero Fahrenheit to a high of 116° above zero Fahrenheit. Winters are severe with frequent strong winds, snow drifts, and low temperatures. Summers are hot, and periods of drought are frequent. The climate restricts crops to cereals or similarly adapted plants.

Hailstorms cause considerable damage, but they are generally confined to small local areas. The area is not in the principal tornado region, but tornadoes and windstorms have occasionally resulted in the loss of life and livestock and have caused severe property damage. The death of a considerable number of people and loss of large numbers of livestock has also been caused by blizzards and severe snowstorms over a period of years. Shelter for livestock and emergency feed are essential during prolonged cold periods and heavy snowstorms. Most of the floods are caused by ice jams in the Missouri River and they have resulted in considerable damage to cultivated fields, buildings, and livestock.

SOILS

Substantially all of the soils in the area are transported and can be classified into two main groups: the glacial drift soils of the plains above the Missouri River Valley and the alluvial soils of the valleys of the Missouri River and its tributaries.

The glacial drift soils of the plains are primarily loam. In small local areas sandy loams, clay loams, stony and gravelly loams occur. These soils are ordinarily friable and adequately drained. They are productive and best suited for the production of small grains, hay, flax, and corn.

The alluvial soils of the valleys and bottom lands vary considerably in texture and include alluvial sands and sandy loams, alluvial loams, clay and clay loams. A large part of this section is not suitable for cultivation because of the sandy soil, the small and disconnected tracts of cultivable lands, and the constant threat of flooding. However, some of the bottom lands are subirrigated and will produce excellent crops of alfalfa, hay, grains, and corn.

With the exception of the steep, rough breaks of the Missouri River and its tributaries, soil erosion is not extreme. In their native state, the plains areas support a good stand of grass and erosion is slight. During periods of drought the cultivated lands are subject to considerable wind erosion. In 1934 cultivated fields in places lost from two to seven inches of soil, and in some areas, fences, ditches, and machinery were entirely covered by soil deposition.

VEGETATION

Two principal types of vegetation occur in the area: short grass type found on the prairies or plains and woodland and shrub type which covers most of the Missouri Valley bottom lands. The plains lands are characterized by a short grass type of vegetation, blue grama being the principal species. Other species present include threadleaf sedge, bluestem wheatgrass, and needleandthreadgrass. Fringed sagebrush is common throughout all the plains area; oniongrass and prairie junegrass are found in considerable amounts. On the rough and broken hillsides, particularly in the breaks of the Missouri River, little bluestem is a major species along with blue grama, needleandthread, prairie junegrass and bluebunch wheatgrass. Pricklypear and dwarf juniper are found in the eroded areas and on clay soils. In the coulees traversing the breaks and rough areas, a brush type is dominant. Snowberry, buffaloberry and Fendler woods rose are accompanied by some small trees consisting of chokecherry, green ash, boxelder, American elm, and bur oak. A typical sandgrass type of vegetation occurs in the small undulating sandhill areas, on sandy ridges, and on loose sandy soils in general. In this type, prairie sandreedgrass is dominant. Associated with this grass are little bluestem, big bluestem, and Canada wildrye. The beds of the alkali lakes are practically barren when dry, but along the shores inland saltgrass, Nuttall alkaligrass, bluestem wheatgrass, and tumblegrass are the chief types of vegetation. In the low depressions and lakes which are relatively free of alkali salts, the principal grasses are American sloughgrass, prairie cordgrass, prairie sandreedgrass and sedges.

The bottom lands of the Missouri River are characterized by a brush and timber type of vegetation. The only substantial growth on the sand bars and newly developed lands, formed by changes in the course of the river, is willow brush. In later stages, eastern poplar, green ash, boxelder, and American elm trees appear accompanied by brush types including Fendler woods rose and snowberry. The understory includes a wide variety of forbs and shrubs including yellow sweetclover, dandelion, vetch, peavine, bluebell, poison ivy and other species. On the higher bottom lands and terraces, bluebunch wheatgrass and valley sagebrush are common. The timber is not of commercial value, but has considerable value locally for poles, posts, and fuel.

Grazing investigations conducted by the North Dakota Agricultural College and United States Department of Agriculture have shown that seven acres of average grazing land on the plains will support one two-year-old steer for a grazing period of five months without over-grazing the range. In the rough areas where considerable erosion has occurred, from 10 to 15 acres are required for one steer. The bottom lands of the Missouri River, because of the dense cover of brush and timber and relatively small amounts of palatable forage, have a fair to low grazing capacity, requiring over 10 acres for one steer for a five-months' grazing season. Because of the large numbers of mosquitoes and flies in the river bottom, cattle seek the higher prairie lands during the summer.

SETTLEMENT HISTORY AND POPULATION

The first settlement of the area began about 84 years ago after its first exploration by General Sully in 1864. After the extension of the Northern Pacific Railroad through the area in the early 1880's, many large cattle ranches were established, the stock utilizing the open public range. The greater part of the open range was acquired by settlers under the homestead laws during the period 1890 to 1910, and cultivated to cash grain crops. Wheat raising was expanded by the demand for food and high prices during the period 1914-1920, but the droughts of 1931-1936 resulted in the abandonment of the marginal farming lands. The small farms of 160 to 320 acres could not provide an adequate living, and agricultural operations have developed into a combination of grain and livestock enterprises with the average size of the farm increasing to 670 acres.

The area is sparsely populated with an estimated population of 75,000 in 1950 or an average of less than 9 persons per square mile. About 60% of the population resides in cities and towns and 40% lives on farms and ranches. Approximately 41% of the urban population lives in Bismarck, the capital of North Dakota. The principal cities or towns in the area in order of population are Bismarck, 18,554; Williston, 7,353; Garrison, 1,888; Linton, 1,671; Stanley, 1,488; Wishek 1,227; Napoleon 1,061; Strasburg, 994; and Washburn, 901. The remaining towns and villages total 33 and range in population from 38 to 851. During the past 20 years, the rural population declined and the urban population increased.

PUBLIC FACILITIES

The main line of the Northern Pacific Railroad extends through the southern part of the area, and the northern part is traversed by the main line of the Great Northern Railroad. The county seats and interior towns in the area are connected with the main lines by branch lines of the above railroads and also by the Minneapolis, St. Paul, and Sault Ste. Marie Railroad. A branch of the Chicago, Milwaukee, St. Paul, and Pacific extends into the area. Towns on these railroads provide shipping points and distribution centers for the area.

U. S. Highways 2, 10, 83, and 85 as well as an adequate network of state and county roads serve the area. The county seats and substantially all of the towns are connected by graded and gravelled roads, and graded roads lead to most of the farms.

Transcontinental telephone and telegraph lines cross the area. The towns and a large percentage of the farms are connected by telephone lines. Rural electrification covers most of the area, and additional lines are planned for the areas not yet served. All cities and towns are served with electric power. Bismarck, Mandan, and Williston are provided with natural gas.

High schools are located in all the cities and towns, and grade school facilities are available to all rural areas. Some rural schools are being maintained, but the consolidation of such schools into a large central school with bus lines for transportation is greatly increasing. Indian schools are located at Elbowoods and at other points on the Fort Berthold Indian Reservation. The modern, beautiful, functional new skyscraper capitol of North Dakota is located at Bismarck. The capitol is the outstanding landmark in the state.

AREA ECONOMY

The economy of the area is based primarily upon crop and livestock production and related activities such as service trades, rail and truck transportation and construction industries. The tourist trade, coal production and a few small manufacturing plants furnish employment to a small number of people. Most of the state employees reside in Bismarck. The area includes large deposits of lignite coal and the development of this resource for oil, gas, and power offers potential possibilities for the future.

Cattle are the principal livestock in the area. In 1944, there were 280,846 cattle and 59,976 sheep within the area. Approximately 25% of the cattle are dairy stock. In 1945 the value of livestock and livestock products sold was $12,912,314. Except for portions of the rough and broken lands adjacent to the Missouri River, there is practically no "open range" within the area. The grazing season ranges from 6 to 8 months, depending primarily upon the occurrence of late snowfalls in the spring or early snows in the fall. Shelter and supplemental feeding for livestock during winter months are necessary. Feed supplies within the area are ordinarily adequate for the necessary winter feeding of livestock. Often there is a surplus of feed in the area which is shipped out for sale to areas where there is a deficiency.

On the basis of information obtained by field examination from county planning boards, soil surveys, and other available data, it is estimated that 65% of the North Dakota Pumping Division area here studied is farm land and 35% is grazing land, including a small portion of wasteland, water surface, and roads. In 1945, about 3,000,000 acres within the area were under cultivation. Of these, approximately 1,500,000 acres were seeded to wheat. Other crops produced in the area in order of importance are oats, barley, flax, wild and tame hay, corn and potatoes. Such crops as rye, mixed grain, sorghum, annual legumes, alfalfa seed, fruits and vegetables are grown but are of minor importance. Except for a small area under irrigation in the Buford-Trenton project of the Bureau of Reclamation lying in the extreme northwestern part of the area, all of the cultivation is carried on under dry-farming practices. Figures of the U.S. Census of Agriculture for 1945 adjusted to conform to the area of study show the value of crops produced in the area to be approximately $56,000,000.

High land values now prevail in this area, due primarily to the favorable precipitation, high yields and high prices for the farm produce. Some tracts of unimproved land, only in part cultivatable, have been sold in 1948 for as high as $48 per acre. The average sale price of state lands sold in 1947 was $19.44 per acre. Private sales for farmlands have ranged from $10 to $50 per acre and for grazing lands from $2 to $10 per acre. All counties within the area have made a concentrated effort to sell county-owned lands in order to get them on the tax rolls. In some cases, county lands of a poor quality were sold for as low as $1 per acre. In 1938, Logan County owned 64,000 acres and by the latter part of 1948 the county had sold all its lands except 320 acres. McKenzie County owned 174,000 acres in 1942 and has now disposed of its lands with the exception of about 6,000 acres. This situation is similar in other counties in the area.

Garrison Lake will cover 400,000 acres of Missouri River bottom and adjacent lands with water. In this area below the high water line there are 151,816 acres of Indian lands, 5,615 acres of public domain lands and 242,569 acres of state and privately-owned land. These areas are of great value to livestock operators for winter shelter and feed. Flooding of these lands will necessitate the relocation of a large number of families, as well as their farm and ranch enterprises. The enterprises of a large number of operators who at present utilize portions of the area to be flooded will be seriously interfered with and the necessary changes constitute a major problem of this report area. Oahe Reservoir will create similar problems in the southern portion of the area, but the acreage involved and the number of families and enterprises to be affected is much less as the Oahe Reservoir will inundate only a relatively small area in North Dakota.

The area offers a strong potential for the defense effort. The large lignite deposits are of immense value for liquid fuel conversion, thermal power, and chemurgy. The probable oil and gas deposits, and the development of low cost power at Garrison Dam are other important resources. Garrison Dam will have an initial power capacity of 240,000 kilowatts and an ultimate capacity of 400,000 kilowatts. While the labor supply is limited, it is of a high type. Development of these resources of the area will attract many new industries. Aluminum reduction and paper plants are possible industrial developments. Low cost power and irrigation will intensify agriculture in this area. Dairying, poultry raising and other intensive enterprises will probably increase in number and volume with low cost power and with rural, urban, and industrial development. The majority of the present rural residents are of Nordic stock with tendencies to develop these enterprises under favorable conditions. Reclamation development of irrigation will help to stabilize the livestock industry and will greatly increase the agricultural potential. Transportation in the area is also favorable to industrial and agricultural development. The main line of the Northern Pacific crosses the area through Bismarck and Mandan. The Great Northern crosses the area through Williston. North-south transportation is provided by the Minneapolis, St. Paul and Sault Ste. Marie Railway. The combination of transportation, power, labor, commercial and social facilities available at Bismarck, Mandan, and Williston will attract the development which will increase their growth.

LAND DEVELOPMENT PROGRAMS

The Bureau of Reclamation proposes the development of 15 units within the North Dakota Pumping Division. Two pumping units are located in Williams County, one near Williston and the other near Hoffland. Thirteen units are located south of Garrison Dam. Two additional proposed units have been abandoned because of the construction of Garrison Dam. The location of the units is shown on the map accompanying this report. The names and irrigable areas of each of the proposed units of the North Dakota Pumping Division of the Bureau of Reclamation are as follows:

North Dakota Pumping Division Unit	Ultimate potential irrigable area in acres
Bismarck	8,500
Burnt Creek	1,310
Fort Clark	2,100
Fort Yates	4,720
Hancock Flats	5,400
Horsehead Flats	6,470
Little Heart	2,270
Manley	1,200
Wesson	7,360
Oliver-Sanger	8,300
Painted Woods	4,300
Square Butte	1,920
Williston	9,080
Winona	4,540
Wogansport	1,650
Total	69,120

Construction is well under way on the Garrison Dam at a point on the Missouri River about 10 miles south of the town of Garrison, North Dakota. According to plans of the Army Engineers, this dam will be completed in 1955. The reservoir created by the dam will back water up the Missouri River to the Montana-North Dakota state line. Garrison Dam is a multiple purpose project for flood control, power, irrigation, and stream flow regulation to benefit navigation and sanitation. Under the Garrison Diversion Project, it is planned to pump water from the Garrison Reservoir into storage reservoirs in the vicinity of Turtle Lake and Snake Creek. From these storage reservoirs the water is to be diverted by canals to the south for the irrigation of 97,000 acres in the vicinity of Underwood and about 111,700 acres near Bismarck and Steele.

Construction was initiated in 1950 on the Oahe Dam in South Dakota. It is to be constructed under the supervision of the Corps of Engineers and will be located on the Missouri River about 6 miles north of Pierre, South Dakota. The upper one-third of the reservoir will be located within North Dakota. The dam will make a lake extending up the river to Bismarck, North Dakota, creating a reservoir of 22,500,000 acre-feet capacity. This is a multiple purpose project for flood control, power, irrigation, navigation, and sanitation. The Oahe Reservoir will be of value to North Dakota for power and recreation.

LAND OWNERSHIP AND MANAGEMENT PROBLEMS

Most of the lands within the North Dakota Pumping Division area are privately owned. The public domain lands comprise about 14,696 acres or only two-tenths of one percent of the total land within the area. The exact amount of public land cannot be definitely determined without survey since the Missouri River is constantly in the process of washing away lands in some places and creating new lands in others. The public land lies in 204 separate parcels widely scattered throughout the area. There is some concentration of the public lands adjacent to the Missouri River in Williams and Mountrail Counties. None of the public domain lands in the area lie within the proposed irrigable area from the waters of the Garrison and Oahe Reservoirs, but approximately 6,800 acres will be below the taking line. A small acreage of public land lies within or adjacent to some of the proposed pumping units along the river, but since these units are still in the planning stage, it cannot be definitely determined at this time as to the exact public lands which will be affected. However, they will be held in Federal ownership pending the final development of pumping units.

The Fort Berthold Indian Reservation occupies approximately 600,000 acres of land within the North Dakota Pumping Division. There are no public lands within the exterior boundaries of the reservation. It has been estimated that 150,000 acres of land within the Indian Reservation will be below the taking line of the lake created by the construction of the Garrison Dam by the Bureau of Reclamation.

Approximately 160,000 acres of lands within the area are located in North Dakota Land Utilization Project No. 24. This project adjoins the Missouri River on the south about 10 miles northwest of Sanish and is under the supervision of the Soil Conservation Service. About 500,000 acres were repurchased under the provision of Title III of the Bankhead-Jones Act to carry out a program of land-use adjustment and conservation. Nearly all of these Title III lands are leased to the McKenzie County Grazing Association under the terms listed in the Soil Conservation Service grazing agreement. Approximately 1,100 acres of public domain lands within the project boundaries were withdrawn for use and administration in connection with the land-use adjustment program. Virtually the entire area is embraced within Soil Conservation Districts. All counties with the exception of Logan County are included in districts.

There are 20 National wildlife refuges within the area comprising a total of 35,092 acres. With the exception of Long Lake, which is owned by the Fish and Wildlife Service, all the others are easement refuges. Long Lake Refuge, located in Burleigh and Kidder Counties, is the largest refuge containing 19,340 acres. Most of the refuges embrace alkali and fresh water lakes. Their primary use in most cases is for migratory waterfowl, but the lake shores and adjoining lands provide a breeding and resting place for upland game birds. Deer and pheasants are an important wildlife resource of the Missouri River bottom and other timbered sites throughout the area. Habitat of these animals will be largely destroyed by the creation of Garrison abd Oahe Lakes.

THE UNRESERVED PUBLIC DOMAIN LANDS

Distribution and location of the unreserved public domain lands in the area is shown on the map accompanying this report. Detailed examination and classification was made of every individual tract of public domain land within the area. The land classification was in terms of use capabilities as a basis for recommended disposition to or management of the land by various governmental agencies, or by private individuals or groups. In addition, detailed information necessary to properly classify each tract of public land as to its suitability for entry under the numerous public land laws is contained in individual reports on file in the Bureau of Land Management, Region III, Billings, Montana. The public domain lands have been classified into four land-use suitability categories; namely flood control, grazing, wildlife, and farming. Details of the description, area, classification, proposed management and appraised value of each parcel of public domain land in the study area are shown in table 5. A discussion of these land-use suitability classifications and the management or disposition that should be made of the land is as follows:

A. Lands to be used for the development of Garrison and Oahe Reservoirs

There are 9,723 acres or 66% of public land which will be primarily valuable for use in the development of the multi-purpose Garrison and Oahe Reservoirs. These lands will be retained in Federal ownership pending the needs of the Corps of Engineers in connection with these reservoirs. Approximately 472 acres of this land have been found suitable for farming. This land is located in the Missouri River bottoms and is sub-irrigated to some extent by the waters from the river. The soil on these lands is a fine sandy loam and is best adapted to the production of alfalfa hay. Lands which have been formerly suitable for grazing but will now be used for flood control amount to 4,325 acres. Nearly 4,069 acres which were suitable for wildlife have been classified for flood control purposes.

These lands that will be used for flood control will also be of value for wildlife conservation, recreation, and navigation and to furnish low cost hydroelectric power. The new uses of this land will aid in developing the economy of the State of North Dakota. Classification of the public domain lands within the North Dakota Pumping Division areas according to their land use capability, condition, and suitability is shown in table 5. All public lands lying in one contiguous body or parcel have been classified separately and are shown on the same line. The 14,696 acres of public land within the area lie in 204 separate parcels. Description and definitions of land-use capability classes are given in table 3.

B. Lands suitable for grazing

There are 3,490 acres or 24% of the public lands within the area which are primarily suitable for grazing use. These lands comprise the hilly areas of the plains, rough and broken areas adjacent to the Missouri River and its tributaries, and the lands adjoining the alkali lakes. With the exception of those lands adjoining the alkali lakes, the tracts have a good cover of palatable forage. The topography and soil of most of these lands precludes sustained cultivation. Most of these lands are entirely surrounded by privately-owned lands and do not contribute to any public land problems. These grazing lands on the plains and those adjacent to alkali lakes can be more economically and effectively used in connection with the adjoining privately-owned lands. They do not contribute to any land management problems and should be disposed of at public sale.

C. Lands suitable for wildlife conservation

There are 1,389 acres or 9% of public lands within the area that have been classified as being primarily valuable for wildlife conservation. This land is located upon the plains above the river. Most of the land is within alkali lakes. These lakes were formed by glacial action and are ordinarily shallow. During the late summer most of the lakes are dry. The soil on the lake bottoms is very saline, making the land unsuitable for forage production or cultivation. The alkali dust, when blown by the wind, is a source of annoyance to livestock and man and sometimes results in the destruction of adjacent crops and vegetation. The alkali water is not suitable for livestock and greatly reduces the value of the lakes for recreation and as a waterfowl habitat. However, these lakes are valuable as a resting place for migratory waterfowl and are of some value as breeding grounds. The alkali and fresh water lakes within wildlife refuges are similar to some of the lakes covering public lands.

The Fish and Wildlife Service and the State of North Dakota will be apprised as to the status of those lands which will not be inundated by Garrison and Oahe Reservoirs and they will be given the opportunity of acquiring them for use and administration. If these agencies do not desire to acquire the lands, they will be offered into public sale. Even though the lands have little or no value for grazing or farming, adjoining owners may desire to acquire the lands to permit economical fencing and consolidation of private holdings.

D. Lands suitable for farming

There are only 25 acres of public land within the area that are classified as suitable for cultivation. This land is located on the plains or rolling areas above the Missouri River. It lies in 3 scattered tracts and is primarily valuable for dry farming. Due chiefly to the small amount of cultivatable land in any one tract (a maximum of 15 acres) none of this land can be properly classified as suitable for homestead entry under Section 7 of the Taylor Grazing Act of June 28, 1934. The lands are principally valuable for use in connection with privately-owned adjacent lands and should be disposed of at public sale.

Table 4. - Climatic Summary of the North Dakota Pumping Division Area, North Dakota[1]

Station	Elevation (Feet)	Record (Years)	Temperature		Killing Frosts Average Dates		Average Precipitation		
			Maximum (Degrees)	Minimum (Degrees)	Length of Record (Years)	Average Frost Free Period (Days)	Length of Record (Years)	Annual (Inches)	Growing Season May to September (Inches)
Ashley[2]	2,025	37	114	-46	33	114	45	17.83	12.39
Linton	1,711	22	116	-52	19	124	45	16.04	11.34
Steele[2]	1,857	36	121	-50	37	115	45	17.37	12.61
Bismarck	1,650	40	114	-45	56	134	45	16.34	10.96
McClusky[2]	1,943	16	115	-53	17	109	45	16.75	11.71
Garrison	1,911	32	106	-47	36	129	45	16.30	11.64
Williston	1,878	40	110	-50	37	130	45	14.80	9.94

[1] Climate and Weather for North Dakota, (prepared by Frank J. Barendick, Meteorologist, U.S. Weather Bureau, Bismarck, North Dakota. Climatic Summary of the United States Sections 34 and 35, Western and Eastern North Dakota, U.S. Weather Bureau. Climate and Man. 1941 Yearbook of Agriculture, U.S. Department of Agriculture.

[2] Stations outside of, but adjacent to, area to study.

Table 5. — Description, area, classification and appraisal of public domain lands within the North Dakota Pumping Division area by counties, 1951[1]

Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification[2]	Principal Suitability	Proposed Management
NORTH DAKOTA										
Burleigh	137 N.	79 W.	22	Lots 1,2, SE¼NW¼	141.08	Level-adjoining Missouri River	Wildlife	VIII	Flood Control	Federal
	137 N.	79 W.	22	SE¼SE¼	40.00	Level-adjoining Missouri River	Wildlife	VIII	Flood Control	Federal
	138 N.	77 W.	4	Lot 3	12.50	Level-inundated when examined	Wildlife	VIII	Grazing	Private
	138 N.	80 W.	8	E½NW¼, N½SW¼, SW¼SW¼, Lots 1,2	266.40	River bottom-slough	Wildlife	VIII	Flood Control	Federal
	138 N.	80 W.	18	Lots 2, 3	76.82	Level-adjacent to Missouri River	Wildlife	VIII	Flood Control	Federal
	138 N.	80 W.	28	Lots 7, 8, 9, 10	172.40	Level	Recreation	VI	Flood Control	Federal
	138 N.	80 W.	28	SW¼	160.00	Level	Recreation	VI	Flood Control	Federal
	138 N.	80 W.	32	Lots 1, 2, 3, 4, SE¼SE¼	218.20	Level	Public Park	VI	Flood Control	Federal
	138 N.	80 W.	33	Lots 2, 3, W½NE¼, NW¼, SW¼, SE¼	613.90	Adjoining Missouri River	Limited Grazing	VI	Flood Control	Federal
	138 N.	80 W.	34	Lots 5, 6, 7	75.81	Sand bar adjoining Missouri River	Grazing/Recreation	VII	Flood Control	Federal
	137 N.	80 W.	3	Lots 12, 13	59.30	Brush and timber, level	Grazing	VI	Flood Control	Federal
	137 N.	80 W.	4	Lots 6, 7, 8, 9, 10, 11	172.90	Level-brush covered	Grazing	VI	Flood Control	Federal
	137 N.	80 W.	5	Lots 1 thru 6, S½NE¼, SE¼NW¼, NE¼SE¼, SE¼	454.20	Within and along Missouri River	Grazing/Recreation	VI	Flood Control	Federal
	137 N.	80 W.	8	Lots 9, 10	85.10	Level-timber covered	Grazing	VI	Flood Control	Federal
	137 N.	80 W.	9	Lot 5	10.60	Level-brush covered	Grazing	VI	Flood Control	Federal
	139 N.	81 W.	4	Lot 1	27.40	Within river channel	Wildlife	VIII	Wildlife	Federal
	139 N.	81 W.	14	Lots 1, 2	29.80	2 acres level, remainder in channel	Grazing/Wildlife	2 A./VI 27.8 A./VIII	Grazing/Wildlife	Private
	141 N.	81 W.	24	Lot 4	46.50	3 acres level, remainder in channel	Grazing/Wildlife	3 A./VI 43.5 A./VIII	Flood Control	Federal
	141 N.	81 W.	26	Lots 1, 2, NE¼SE¼, SW¼SE¼	161.60	Major portion within & adj. River	Grazing and Dry Farming	16 A./III 49.0 A./VI 96.6 A./VIII	Flood Control	Federal
	142 N.	81 W.	4	Lot 4	19.60	Major portion within river channel	Grazing/Wildlife	2 A./VI 17.6 A./VIII	Grazing/Wildlife	Federal
	144 N.	77 W.	22	NE¼	160.00	Major portion in alkali lake	Wildlife/Grazing	4 A./VI 156.0 A./VIII	Grazing/Wildlife	State
Emmons	129 N.	79 W.	4	Lots 4, 5, 6	226.90	Within river channel	Wildlife	VIII	Flood Control	Federal
			5	Lots 1, 2, 3						
	130 N.	79 W.	33	Lot 4	21.10	Within river channel	Wildlife/Grazing	VIII	Flood Control	Federal
	131 N.	77 W.	30	Lot 3	37.56	Rolling to steep	Grazing	VI	Grazing	Private
	133 N.	78 W.	18	Lot 4	26.30	River bottom land	Grazing/Wildlife	24.3 A./VII 2 A./VIII	Flood Control	Federal
	133 N.	79 W.	12	Lots 1, 2, 3, 4	83.80	Level river channel	Wildlife	3 A./VI 80.8 A./VIII	Flood Control	Federal
	134 N.	78 W.	7	Lot 10	17.88	Rolling to hilly	Grazing	VI	Grazing	Private
	135 N.	77 W.	30	NE¼NE¼	40.00	Rolling to rough	Grazing	VI	Grazing	Private
	135 N.	78 W.	28	NE¼NE¼	40.00	Rough and rolling prairie land	Grazing	4 A./III 36 A./VI	Grazing	Private
	135 N.	78 W.	33	Lot 2	2.49	Rolling	Grazing	VI	Grazing	Private
	135 N.	79 W.	1	Lot 1	4.96	River bottom land	Grazing/Wildlife	VIII	Flood Control	Federal
	135 N.	79 W.	12	Lots 5, 6	45.00	River bottom land	Wildlife	VIII	Flood Control	Federal
	135 N.	79 W.	34	Lots 5, 6	13.00	Within river channel	Wildlife	VIII	Flood Control	Federal
	136 N.	78 W.	12	NE¼SW¼	40.00	Rolling to rough	Grazing	VII	Grazing	Private
	136 N.	78 W.	20	Lot 5	20.62	Rolling	Grazing	VI	Grazing	Private
	136 N.	79 W.	13	SW¼, W½SE¼	485.60	Level river bottom land	Wildlife	VIII	Flood Control	Federal
	136 N.	79 W.	14	SE¼SE¼, Lots 4, 5						
	136 N.	79 W.	23	NE¼NE¼, Lots 1, 2						
	136 N.	79 W.	24	NW¼NW¼						
McKenzie	151 N.	99 W.	6	Lot 5	38.25	Rolling to rough and steep	Grazing	VII	Grazing/Wildlife	Private
	152 N.	93 W.	8	Lot 4	14.95	Level to rolling	Grazing	VI	Grazing	Private
	152 N.	98 W.	5	Lot 2	29.11	Breaks and badlands	Grazing	VII	Grazing/Wildlife	Federal, State or Private
	152 N.	99 W.	5	Lot 3	12.10	Rough river breaks	Grazing	VI	Grazing/Wildlife	Federal, State or Private
	152 N.	99 W.	7	Lot 3	37.60	Rolling to steep and rough	Grazing	VII	Grazing/Wildlife	Private
	152 N.	100 W.	2	Lot 12	41.50	Within and adjoining Missouri River	Grazing/Wildlife	3.8 A./VII 37.7 A./VIII	Flood Control	Federal
	152 N.	100 W.	3	Lot 7						
	152 N.	100 W.	5	Lots 9, 10	42.00	Within and adjoining Missouri River	Wildlife	VIII	Flood Control	Federal
	152 N.	100 W.	24	SE¼NW¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	100 W.	24	SE¼SE¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private

Table 5. — Description, area, classification and appraisal of public domain lands within the North Dakota Pumping Division area by counties[1] (Continued)

Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification	Principal Suitability	Proposed Management
NORTH DAKOTA										
McKenzie	152 N. 152 N.	100 W. 100 W.	24 25	SW¼SW¼ W½NW¼	120.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	100 W.	26	NE¼NW¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	101 W.	12	NW¼SE¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	101 W.	14	SW¼SW¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	101 W.	14	SE¼SE¼	40.00	Hilly	Grazing	VII	Grazing	Private
	152 N.	101 W.	22	SE¼NW¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	102 W.	2	Lot 12	40.00	Rolling to steep and rough	Grazing	VI	Grazing	Private
	152 N.	102 W.	21	Lot 5	1.01	Entirely embraced by road right of way	Grazing	VIII	Road right of way	County
	152 N. 152 N.	108 W. 103 W.	9 10	Lot 5 Lot 5	31.70	Within and adjoining Missouri River	Grazing/Wildlife	VII	Flood Control	Federal
	152 N. 152 N.	103 W. 103 W.	13 14	Lots 6, 7 Lot 5	59.85	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	103 W.	24	SE¼SW¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	152 N.	104 W.	19	W½SE¼SE¼, SE¼SE¼SE¼	30.00	Level to rolling and rough	Grazing/Wildlife	VII	Wildlife/Grazing	Private
	152 N.	104 W.	21	Lot 7	17.50	Within and adjoining Missouri and Yellowstone Rivers	Grazing/Wildlife	15.5 A./II 2.0 A./VIII	Wildlife/Dry Farm	Private
	152 N.	104 W.	22	Lots 3, 4	16.60	Within Yellowstone River channel	Grazing/Wildlife	VIII	Wildlife	Federal
	152 N. 152 N.	104 W. 104 W.	27 28	SW¼SW¼ Lot 8	65.00	Level river bottom	Grazing/Wildlife	VII	Grazing/Potential Farming	Private
	152 N. 152 N. 152 N. 152 N.	104 W. 104 W. 104 W. 104 W.	28 29 32 33	Lot 7 Lots 1, 2, 3 N½NE¼ NW¼NW¼	206.60	Within and adjoining Missouri and Yellowstone Rivers, level river bottom	Grazing/Wildlife	135 A./VI 71.60 A./VII	Wildlife	Federal
	153 N.	93 W.	28	Lots 5, 6, 7, 8, S½SW¼	191.90	Level river bottom land	Grazing/Wildlife	VI	Flood Control	Federal
	153 N. 153 N. 153 N.	98 W. 98 W. 98 W.	11 13 14	Lots 5, 8 N½NW¼, NW¼NE¼ Lots 1, 4, 5, 8	214.50	Within and adjoining Missouri	Grazing/Wildlife	134.1 A./VI 80.4 A./VIII	Flood Control	Federal
	153 N.	98 W.	22	Lot 3	.54	In Missouri River	None	VIII	Flood Control	Federal
	153 N.	98 W.	23	Lots 1, 4, 5	50.50	Within and adjoining river	Grazing/Wildlife Hay prodution	1.3 A./VI 5.0 A./IV 44.2 A./VIII	Flood Control	Federal
	153 N.	98 W.	24	SE¼NW¼	40.00	Within and adjoining Missouri river	Grazing/Wildlife	16 A./VII 24 A./VIII	Flood Control	Federal
	 153 N.	 98 W.	24 25	SW¼SE¼ W½NE¼	120.00	Rolling to steep and rough	Grazing	120 A./VII	Flood Control	Federal
	153 N.	98 W.	26	Lots 1, 4	35.37	River bottom land	Wildlife	VIII	Flood Control	Federal
	153 N. 153 N. 153 N. 153 N.	98 W. 98 W. 98 W. 98 W.	21 28 28 29	Lots 5, 6, 7 Lots 1, 2, 3, N½NE¼, SE¼NW¼, NE¼SW¼, SW¼SW¼ Lot 5	406.83	Within and adjoining Missouri River	Grazing/Wildlife Hay production	35 A./V 371.83 A./VIII	Flood Control	Federal
	153 N.	98 W.	28	SE¼SE¼	40.00	Within and adjoining Missouri River	Grazing	VII	Flood Control	Federal
	153 N.	98 W.	34	NE¼SW¼	40.00	Rolling to steep and rough	Grazing	VII	Flood Control	Federal
	153 N.	99 W.	32	Lot 7	(30.20)	Washed away—non existent	—	—	—	—
	153 N.	99 W.	35	Lot 6	15.57	Flat river bank, 10.57 A. washed away	Wildlife	VIII	Wildlife	Federal
	153 N.	100 W.	8	Lots 2, 3	66.20	Within and adjoining Missouri River	Grazing/Wildlife	19.2 A./VII 47.0 A./VIII	Flood Control	Federal
	153 N.	100 W.	18	Lots 3, NE¼SW¼	79.85	Rolling to steep and rough	Grazing/Wildlife	VII	Grazing	Private
	153 N.	100 W.	27	Lot 3	2.30	Flat river wash	Grazing	III	Flood Control	Federal
	153 N. 153 N. 153 N. 153 N.	100 W. 100 W. 100 W. 100 W.	28 32 33 34	Lot 5 Lot 4 Lots 1,2,3, NE¼NE¼ Lots 1,2,3, SW¼NW¼	306.50	Within and adjoining Missouri River	Grazing/Dry Farm	101.4 A./III 42.3 A./VII 162.8 A./VIII	Flood Control	Federal

Table 5. — Description, area, classification and appraisal of public[1] domain lands within the North Dakota Pumping Division area by counties, 1951[1] (Continued)

Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification	Principal Suitability	Proposed Management
NORTH DAKOTA										
McKenzie	153 N.	100 W.	32	Lot 2	15.40	Within and adjoining Missouri River	Grazing	VI	Flood cootrol	Federal
	153 N.	100 W.	32	NE¼SW¼	40.00	Within and adjoining Missouri River	Grazing/Wildlife	VII	Flood control	Federal
	153 N.	101 W.	10	SE¼SE¼	40.00	Rolling to rough and steep	Grazing/Wildlife	VII	Grazing	Private
	153 N.	101 W.	19	Lots 4, 5, 8	38.00	Within river channel	Wildlife	VIII	Wildlife	State
	153 N.	102 W.	25	Lots 7, 8	66.50	River bottom lands	Wildlife/Grazing	43 A./VI 23.5 A./VIII	Wildlife	Federal
	153 N.	102 W.	26	Lots 7, 8	84.20	River bottom lands	Wildlife/Grazing	7 A./VI 77.2 A./VIII	Wildlife	Federal
	153 N.	102 W.	29	Lot 3	3.90	River bottom land	Wildlife	VII	Wildlife	State
	153 N.	102 W.	34	Lot 7	26.30	Level bench land all but four acres washed into the river	Wildlife/Dry Farm	3 A./II 1 A./VI 22.3 A./VIII	Wildlife/ Dry Farm	Private
	154 N.	97 W.	22	Lots 4, 5, 6, 7, SW¼SE¼	336.04	Level river bottom lands	Wildlife/Dry Farm	95 A./II 241.04 A./VIII	Flood control	Federal
	154 N.	97 W.	23	Lot 5						
	154 N.	97 W.	27	Lot 1						
	154 N.	97 W.	28	Lots 4, 5, 6						
	154 N.	97 W.	23	Lot 7	20.75	Level river bottom land	Wildlife/Dry Farm	5 A./II 15.75 A./III	Flood control	Federal
	154 N.	101 W.	25	Lot 8	30.32	Within and adjoining Missouri River	Wildlife	30.32 A./VIII	Flood control	Federal
	154 N.	101 W.	35	Lot 3	18.70	Within and adjoining Missouri River	Wildlife	18.70 A./VIII	Flood control	Federal
	154 N.	101 W.	35	Lots 4, 5	46.50	Withio and adjoining Missouri River	Wildlife/Dry Farm	33.00 A./II 13.50 A./VIII	Flood control	Federal
McLean	143 N.	81 W.	6	Lots 1, 2	20.13	Within Missouri River channel	Wildlife	20.13 A./VIII	Wildlife	Federal
	143 N.	81 W.	18	Lot 3	23.50	Within Missouri River channel	Wildlife	23.50 A./VIII	Wildlife	Federal
	143 N.	81 W.	30	Lot 1	2.40	Level bottom land	Grazing/Wildlife	2.40 A./III	Flood control	Federal
	144 N.	84 W.	8	Lots 1, 2, 3	64.00	Island in Missouri River	Wildlife	64.00 A./VIII	Wildlife	State
	145 N.	84 W.	34	Lots 3, 4	30.60	Within Missouri River channel	Wildlife	30.60 A./VIII	Wildlife	Federal
	146 N.	84 W.	6	Lot 12	17.05	Within Missouri River channel	Wildlife	17.05 A./VIII	Wildlife	Federal
	146 N.	84 W.	32	Lots 1, 4, 5, 8	94.67	Within Missouri River channel	Wildlife	94.67 A./VIII	Wildlife	Federal
	147 N.	80 W.	24	Lot 4	18.20	Geotly rolling-slopes to lake	Farming/Grazing	7 A./II 11.2 A./VI	Flood control	Federal
	147 N.	81 W.	22	Lot 1	0.12	Level to gently rolling	Grazing/Wildlife	.12 A./VI	Flood control	Federal
	147 N.	81 W.	22	Lot 5	2.58	Level to gently rolling	Grazing	2.58 A./III	Flood control	Federal
	147 N.	84 W.	10	Lot 5	3.42	Level to rough	Grazing/Dry Farm	2 A./II 1.42 A./VI	Flood control	Federal
	148 N.	82 W.	29	SE¼SW¼	40.00	Within and adjoining small Fish and Wildlife lake	Grazing/Wildlife	10 A./III 22 A./VI 8.A./VIII	Flood control	Federal
	148 N.	82 W.	32	Lot 1	2.70	Within and adjoining small lake	Grazing	2.7 A./VI	Flood control	Federal
	148 N.	83 W.	13	NE¼SE¼	40.00	Within and adjoining small Fish and Wildlife lake	Grazing/Wildlife	4 A./VI 36 A./VIII	Flood control	Federal
	148 N.	85 W.	30	Lot 3	27.90	Level to rolling and steep	Grazing	27.90 A./VI	Flood control	Federal
	149 N.	84 W.	11	E½SW¼	80.00	Entirely within intermitteot alkali lake	Wildlife	80 A./VIII	Wildlife	State
	150 N.	84 W.	27	NW¼SE¼	40.00	Within and adjoining small alkali lake	Wildlife/Grazing	5 A./VI 35 A./VIII	Grazing/Wildlife	State
	150 N.	86 W.	1	Lot 1	.20	Level	Wildlife/Grazing	.20 A./VI	Grazing/Wildlife	State
	150 N.	86 W.	22	S½NW¼, NW¼SW¼	120.00	Rolling swampy lake shore	Alakli Lake/ Grazing	50 A./VII 70 A./VIII	Grazing/Wildlife	Private
Mountrail	152 N.	90 W.	5	SW¼SE¼	40.00	Rolling to moderately steep	Grazing	40 A./VI	Grazing	Private
	153 N.	90 W.	20	NE¼NE¼	40.00	Level to rolling	Grazing	40 A./VI	Grazing	Private
	153 N.	92 W.	4	Lot 1	39.43	Flat plateau cut by canyons	Grazing	39.43 A./VI	Grazing	Private
	153 N.	92 W.	27	SW¼NE¼	40.00	Rolling to steep	Grazing	40 A./VI	Grazing	Private
	153 N.	92 W.	34	NE¼NW¼	40.00	Rolling to steep	Grazing	40.A./VI	Grazing	Private
	153 N.	93 W.	8	Lots 2, 4	42.50	Within and adjoining Missouri River	Grazing/Wildlife	26.5 A./VII 16.0 A./VIII	Flood control	Federal
	153 N.	93 W.	13	SE¼SW¼	40.00	Rolling	Grazing	40 A./VI	Grazing	Private
	153 N.	93 W.	15	SW¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Flood control	Federal

Table 5. — Description, area, classification and appraisal of public domain lands within the North Dakota Pumping Division area by counties, 1951 (Continued)

Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification	Principal Suitability	Proposed Management
NORTH DAKOTA										
Mountrail	153 N.	93 W.	20	Lots 3, 4, 5	93.40	Level, river bottom land	Wildlife	64.4 A./VII 29 A./VIII	Flood control	Federal
	153 N.	93 W.	26	Lots 1, 2, 3, SE¼NE¼, E½NW¼, E½SE¼, NW¼SE¼						
	153 N.	93 W.	35	Lots 1, 2, E½NE¼	487.30	Within and adjoining Missouri River	Wildlife/Grazing	375.3 A./VI 112 A./VIII	Flood control	Federal
	153 N.	94 W.	2	Lot 3	40.31	Sandbars and river bottom	Wildlife/Grazing	40.31 A./VII	Flood control	Federal
	153 N.	94 W.	3	Lots 1, 2, 4	76.30	Sandbars and river bottom	Wildlife/Grazing	76.3 A./VII	Flood control	Federal
	154 N.	91 W.	4	Lot 4, SW¼NE¼, NW¼SW¼	120.06	Rolling to steep and rough	Wildlife	120.05 A./VI	Grazing	Private
	154 N.	92 W.	22	SE¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	154 N.	92 W.	31	Lot 1	38.85	Rolling to steep and rough	Grazing	38.85 A./VI	Grazing	Private
	154 N.	93 W.	30	NW¼NE¼	40.00	Rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	154 N.	93 W.	31	SE¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	154 N.	94 W.	10	NE¼SW¼	40.00	Rolling to steep and rough	Wildlife	40 A./VII	Flood control	Federal
	154 N.	94 W.	20	NW¼NW¼	40.00	Rolling to steep and rough	Wildlife	40 A./VII	Flood control	Federal
	154 N.	94 W.	23	E½NE¼, NE¼SE¼						
	154 N.	94 W.	24	NW¼SW¼	160.00	Rolling to steep and rough	Wildlife	160 A./VII	Flood control	Federal
	154 N.	94 W.	25	NW¼SW¼	40.00	Rolling to steep and rough	Wildlife	40 A./VII	Flood control	Federal
	154 N.	94 W.	34	Lot 1 ✓	12.88	Sand bar and river bottom	Grazing	12.88 A./VII	Flood control	Federal
	154 N.	94 W.	34	Lot 2 ✓						
	154 N.	94 W.	35	Lot 2 ✓	47.90	Sand bar and river bottom	Grazing	47.9 A./VII	Flood control	Federal
	155 N.	91 W.	5	Lot 3	39.83	Rolling to steep and rough	Grazing	39.83 A./VI	Grazing	Private
	155 N.	91 W.	7	NW¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	155 N.	94 W.	15	SW¼NE¼	40.00	Level to rolling and rough	Grazing/Dry Farm	1 A./II 39 A./VI	Grazing/Farm	Private
	155 N.	94 W.	35	SW¼NW¼	40.00	Rolling to rough and steep	Grazing	40 A./VII	Grazing	Private
Williams	152 N.	100 W.	3	Lot 6	17.00	Within river channel	Grazing/Wildlife	17 A./VIII	Flood control	Federal
	152 N.	100 W.	4	Lots 15, 16	32.10	Within river channel	Wildlife	32.1 A./VIII	Flood control	Federal
	152 N.	103 W.	3	Lots 13, 14	28.90	Within river channel	Grazing/Wildlife	28.9 A./VII	Flood control	Federal
	152 N.	103 W.	6	Lot 11	40.00	Level to slightly sloping	Grazing	40.0 A./VI	Grazing	Private
	152 N.	103 W.	10	Lot 1	35.30	Within river channel	Grazing/Wildlife	35.3 A./VII	Flood control	Federal
	152 N.	103 W.	10	Lot 3	37.00	Within river channel	Grazing/Wildlife	37.0 A./VII	Flood control	Federal
	152 N.	103 W.	14	Lot 2	13.00	Within river channel	Wildlife	13.0 A./VIII	Flood control	Federal
	152 N.	103 W.	20	Lots 1, 3	51.00	Washed away—non-existent	—	—	—	—
	152 N.	103 W.	30	Lot 5	20.80	Level, adjoining Missouri River	Grazing/Farming	14 A./V 6.8 A./VII	Flood control	Federal
	152 N.	104 W.	14	Lots 1, 2, 3	88.20	Within river and adjoining	Wildlife	88.2 A./VIII	Wildlife	State
	152 N.	104 W.	20	Lot 4	17.10	Within and adjoining Missouri and Yellowstone Rivers	Wildlife	17.1 A./VIII	Wildlife	Federal
	152 N.	104 W.	21	Lot 4						
	152 N.	104 W.	24	Lots 2, 3	46.06	Within and adjoining Missouri River	Grazing/Wildlife	7 A./VI 39.05 A./VIII	Wildlife	State
	153 N.	98 W.	11	Lots 2, 3	54.00	Within and adjoining Missouri River	Grazing/Wildlife	10 A./VI 44 A./VIII	Flood control	Federal
	153 N.	98 W.	21	Lots 1, 2, 3,						
	153 N.	98 W.	22	Lots 1, 2, S½NE¼, N½SE¼	517.53	Within and adjoining Missouri River	Grazing/Wildlife	38 A./III 479.53 A./VII	Flood control	Federal
	153 N.	98 W.	23	Lots 6, 7, N½SW¼						
	153 N.	98 W.	26	Lots 2, 3						
	153 N.	98 W.	27	Lot 4	39.82	Within and adjoining Missouri River	Wildlife/Hay Production	39.82 A./VII	Flood control	Federal
	153 N.	98 W.	31	Lot 1	11.75	Within and adjoining Missouri River	Wildlife	11.75 A./VIII	Flood control	Federal
	153 N.	98 W.	31	Lot 4	11.50	Within and adjoining Missouri River	Wildlife	11.50 A./VIII	Flood control	Federal
	153 N.	98 W.	31	Lot 6	37.23	Within and adjoining Missouri River	Wildlife	37.23 A./VIII	Flood control	Federal
	153 N.	98 W.	32	Lot 3	24.41	Within and adjoining Missouri River	Wildlife	24.41 A./VIII	Flood control	Federal
	153 N.	99 W.	15	SW¼, S½NW¼, S½SE¼, NE¼SE¼	360.00	Rolling to rough and steep	Grazing	360 A./VII	Flood control	Federal
	153 N.	99 W.	28	NW¼NW¼	40.00	Rolling to rough and steep	Grazing/Wildlife	40 A./VII	Flood control	Federal

Table 5 — Description, area, classification and appraisal of public domain lands within the North Dakota Pumping Division area by counties, 1951 (Continued)

Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification	Principal Suitability	Proposed Management
NORTH DAKOTA										
Williams	153 N.	99 W.	28	NW¼NE¼	40.00	Rolling to rough and steep	Grazing/Wildlife	40 A./VII	Flood control	Federal
	153 N.	99 W.	31	Lot 3	19.90	Within and adjoining Missouri River	Grazing/Wildlife	13 A./VII 6.9 A./VIII	Flood control	Federal
	153 N.	99 W.	33	Lots 3, 4		Within and adjoining Missouri River				
	153 N.	99 W.	34	Lots 1, 2, 3, 4	190.70		Wildlife	19 A./VII 171.7 A./VIII	Flood control	Federal
	153 N.	100 W.	26	SW¼SW¼	40.00	Level to sloping	Grazing/Dry Farm	1 A./III 39 A./VI	Grazing/Dry Farm	Private
	153 N.	100 W.	6	Lot 4	27.00	Within Missouri River channel	Wildlife	27 A./VIII	Flood control	Federal
	153 N.	100 W.	9	Lot 8	24.50	Within and adjoining Missouri River	Grazing/Wildlife	21.5 A./VII 3 A./VIII	Flood control	Federal
	153 N.	100 W.	6	Lot 5	30.64	Within Missouri River channel	Grazing/Wildlife	30.64 A./VII	Grazing/Wildlife	State
	153 N.	101 W.	6	Lot 9	54.70	Within Missouri River channel	Grazing/Wildlife	2 A./VII 52.7 A./VIII	Grazing/Wildlife	State
	153 N.	101 W.	7	Lot 2						
	153 N.	102 W.	20	Lots 2, 3	15.60	Within and adjoining Trenton Lake	Grazing/Wildlife	3 A./VI 12.6 A./VIII	Grazing/Wildlife	State
	153 N.	102 W.	22	Lots 2, 3	(37.00)	Washed away—non existent	—	—	—	—
	153 N.	103 W.	9	NW¼NE¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	153 N.	103 W.	26	SW¼NW¼, NE¼SW¼	80.00	Rolling to steep and rough	Grazing	80 A./VII	Grazing	Private
	153 N.	103 W.	27	NE¼SW¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	153 N.	103 W.	32	SW¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	153 N.	103 W.	33	NW¼NW¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	153 N.	104 W.	10	Lot 1	29.91	Rolling to steep and rough	Grazing	29.91 A./VII	Grazing	Private
	153 N.	104 W.	34	SE¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VII	Grazing	Private
	154 N.	95 W.	7	Lots 2, 3, 4	190.61	Level to steep and rough	Grazing	113.74 A./VI 76.87 A./VII	Grazing	Private
	154 N.	96 W.	12	SE¼NE¼, NE¼SE¼						
	154 N.	95 W.	10	N½SE¼	80.00	Level to rolling	Grazing	80 A./VII	Flood control	Federal
	154 N.	95 W.	17	NE¼SE¼	40.00	Level to rolling	Grazing	40 A./VII	Flood control	Federal
	154 N.	95 W.	21	NE¼NW¼	40.00	Level to rolling	Grazing	7 A./II 33 A./VII	Flood control	Federal
	154 N.	95 W.	27	Lot 4	53.70	Sand bars in Missouri River bottom	Wildlife	53.7 A./VIII	Flood control	Federal
	154 N.	95 W.	28	SE¼NW¼	40.00	River bottom land	Grazing/Dry Farm	40 A./II	Flood control	Federal
	154 N.	95 W.	29	Lots 1, 2, E½SW¼, SW¼SW¼	384.85	Within Missouri River channel	Wildlife	40 A./VII 344.85 A./VIII	Flood control	Federal
	154 N.	95 W.	30	Lots 3, 4, 5, NE¼SE¼						
	154 N.	95 W.	31	Lot 1						
	154 N.	95 W.	32	Lots 3, 4						
	154 N.	96 W.	27	Lot 4	16.70	Within and adjoining Missouri River	Wildlife	16.7 A./VIII	Flood control	Federal
	154 N.	97 W.	17	SW¼NE¼	40.00	Rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	154 N.	97 W.	23	Lot 3	12.24	River bottom level, cut by sloughs	Grazing/Wildlife	12.24 A./VII	Flood control	Federal
	154 N.	98 W.	35	Lot 1	24.30	Rolling to hilly	Grazing/Dry Farm	21 A./II 3.3 A./VII	Flood control	Federal
	154 N.	100 W.	4	W½SW¼, SE¼SW¼, SW¼SE¼	480.00	Gently rolling to steep and rough	Grazing	480 A./VI	Grazing	Private
	154 N.	100 W.	5	E½SE¼						
	154 N.	100 W.	8	NE¼NE¼						
	154 N.	100 W.	9	NE¼						
	154 N.	100 W.	5	SW¼SW¼	160.00	Gently rolling to steep and rough	Grazing	160 A./VI	Grazing	Private
	154 N.	100 W.	7	E½NE¼						
	154 N.	100 W.	6	NW¼NW¼						
	154 N.	100 W.	8	S½SE¼	80.00	Gently rolling to steep and rough	Grazing	80 A./VI	Grazing	Private
	154 N.	100 W.	17	NW¼NW¼	40.00	Gently rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	154 N.	100 W.	31	Lots 2, 3, 4	88.50	Within Missouri River channel	Wildlife	88.5 A./VIII	Flood control	Federal
	154 N.	100 W.	33	SE¼SE¼	40.00	Rolling to steep and rough	Grazing	40 A./VI	Grazing	Private
	154 N.	101 W.	25	Lot 5	6.70	Within and adjoining Missouri River	Wildlife	6.7 A./VIII	Flood control	Federal
	154 N.	101 W.	29	SW¼SE¼	40.00	Level and rolling	Grazing/Farming	19 A./II 16 A./VI 5 A./VIII	Flood control	Federal
	154 N.	101 W.	33	Lots 1, 2, 3, 4						
	154 N.	101 W.	34	Lots 1, 2, 3	219.20	Within and adjoining Missouri River	Wildlife	15 A./VII 204.2 A./VIII	Flood control	Federal

Table 5 — Description, area, classification and appraisal of public domain lands within the North Dakota Pumping Division area by counties, 1951 (Continued)

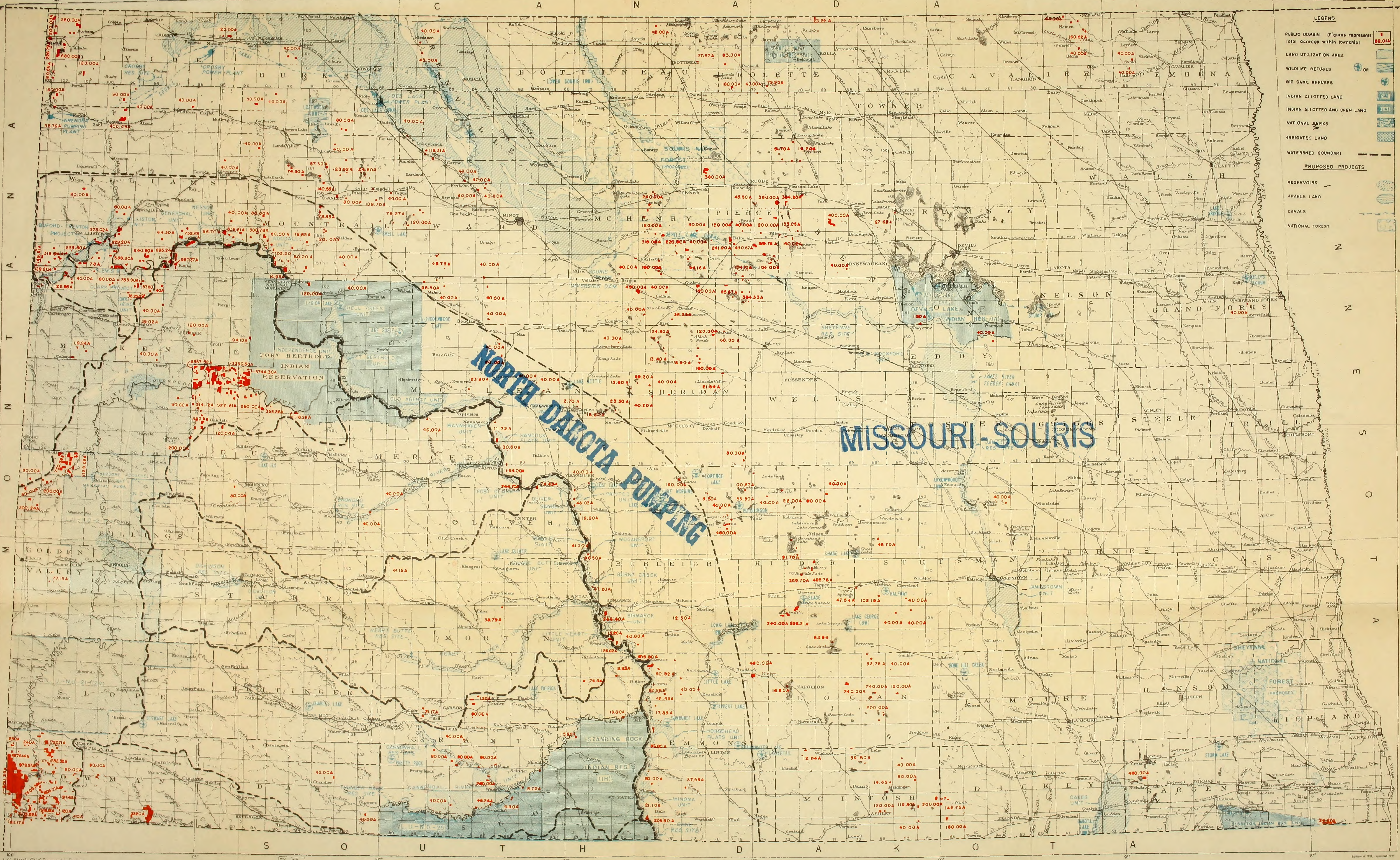
Sixth Principal Meridian

County	Twp.	Rge.	Sec.	Subdivision	Acres	General Land Character	Present Land Use	Land Capability Classification	Principal Suitability	Proposed Management
NORTH DAKOTA										
Williams	155 N.	95 W.	29	SE¼NE¼	40.00	Rolling to steep and rough	Grazing	VII	Grazing	Private
	155 N.	97 W.	21	SE¼SE¼	40.00	Hilly with large coulees	Grazing	VI	Grazing	Private
	155 N.	100 W.	18	SW¼SE¼	40.00	Level to gently rolling	Wildlife/Grazing	VI	Flood control	Federal
	155 N.	100 W.	22	NE¼NW¼	40.00	Gently rolling to steep and rough	Grazing	VI	Grazing	Private
	156 N.	102 W.	14	NE¼SW¼, NW¼SE¼	80.00	Rolling to rough and rocky	Grazing	VI	Grazing	Private
				TOTAL ACRES	14,628.42					

1/ Compiled from the records of the Bureau of Land Management, Region III, Billings, Montana, as of July 1, 1951. No appraisal has been made of lands to be used for flood control.
2/ See table 3 for detailed description of land use capability classification.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF NORTH DAKOTA


C A N A D A
M O N T A N A
M I N N E S O T A
S O U T H D A K O T A
NORTH DAKOTA PUMPING
MISSOURI-SOURIS
LEGEND
PUBLIC DOMAIN (Figures represents total acreage within township) 82.01A
LAND UTILIZATION AREA
WILDLIFE REFUGES OR
BIG GAME REFUGES
INDIAN ALLOTTED LAND (A)
INDIAN ALLOTTED AND OPEN LAND (IH)
NATIONAL PARKS
IRRIGATED LAND
WATERSHED BOUNDARY
PROPOSED PROJECTS
RESERVOIRS
ARABLE LAND
CANALS
NATIONAL FOREST
FORT BERTHOLD INDIAN RESERVATION
STANDING ROCK INDIAN RES (IH)
DEVILS LAKE INDIAN RES (IA)
SISSETON INDIAN RES (IH)
SOURIS NAT'L FOREST (PROPOSED)
SHEYENNE NATIONAL FOREST (PROPOSED)
Scale 1/500000
Miles
Kilometers
Projection is polyconic (modified)
Horizontal datum is North American
★ State Capital
FARGO County Seat name
City or large town
Town or village
Railroad
Relation of the State of North Dakota to sheets of the Map of the World on the scale of 1:1,000,000
Edition of 1921, reprinted 194
GPO O FSO

J. G. Staack, Chief Topographic Engineer
A. F. Hassan, Cartographic Engineer
Compiled in 1920

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